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According to Rostafinski (Supplement to Monograph) 229 species in all are known to science. There have been found, up to the present time, about 180 species within the limits of the United States, including a number of yet unrecorded species and omitting the uncertain or duplicated Schweinitzian species.

The physiological literature of this group has been recently enriched by "Die Pilzthiere oder Schleimpilze" of Zopf, which, with De Bary's Mycetozoa, epitomizes the latest knowledge of the subject.

For systematic study the "Monografia Sluzowce" of Rostafinski (in Polish) is exhaustive, but practically inaccessible to students in general. The ground, however, is largely covered for American students by the "Myxomycetes of Great Britain" (Cooke); the "Myxomycetes of United States" (Cooke); a list of all recorded American forms compiled from all published sources to the date of publication (Annals of New York Lyceum of Nat. Hist., 1876); the "New York State Reports" (Peck); and "Grevillea."

Notes on Carex.—IV.

BY L. H. BAILEY, JR.

1. CAREX TRICHOCARPA, Muhl., Gram. 257 (1817). Culms slender, 2 or 3 feet high: leaves narrow (2 to 3 lines wide), long pointed, scabrous, the sheaths smooth: staminate spikes two or three together on a slender peduncle 2 to 5 inches long, their scales appressed, obtuse or nearly so, usually erose: pistillate spikes cylindrical (about 2 inches long and 4 or 5 lines wide), mostly loosely flowered towards the base, the lower on exserted stalks: perigynium setose-hairy, conspicuously marked with ridge-like nerves, broadly ovate at the base, tapering rather abruptly into a cylindrical beak which is tipped by nearly upright teeth a line long, twice or more the length of the ovate scale.—Moist or wet grounds throughout the Northern States east of the Mississippi. A form with nearly lanceolate perigynia and shorter spikes from New York is the var. *turbinata* of Dewey, Sill. Journ. xi. 159 (1876).

Var. IMBERBIS, Gray, Man. 5th ed. 597 (1867). Perigynium smooth, teeth usually shorter, pistillate scales longer and sheaths scabrous.—New York, *Sartwell*, to Illinois, *S. B. Mead*, *E. Hall*.

Var. DEWEYI. Staminate scales very acute, mostly loose:

pistillate spikes rather thick (1 or 2 inches): perigynium very smooth, usually somewhat polished, rather coriaceous, the nerves not conspicuous, ovate-lanceolate and rounded, the teeth mostly short, usually a little rough: scales very acute, about the length of the perigynium.—*C. laeviconica*, Dew., Sill. Journ. xxiv. 47 (1857). Big Sioux and Yellowstone rivers, *Hayden*, Bismarck, Dakota, *A. B. Seymour*, 1884, and northward. Very variable; the typical forms are slender with short pistillate spikes and short erect teeth, but they connect themselves in various ways with

Var. *ARISTATA*. Culm 2 to 4 feet high, mostly stout and often spongy below: leaves broad (4 to 6 lines), their under surface as well as the sheaths loosely hairy: staminate spikes more remote or often numerous and aggregated, their scales awl-pointed and more or less spreading: pistillate spikes usually thick, attenuated below: perigynium smooth, ovate-lanceolate, conspicuously nerved, terminating in very long (2 or 3 lines) awl-like mostly widely spreading teeth: scales awl-pointed, the lower often exceeding the perigynium.—*C. aristata*, R. Br. Narrative Frankl. Exped. Append. 764 (1823); *C. orthostachys*, C. A. Meyer, Fl. Alt. iv. 231 (1833); *C. mirata*, Dew., Wood's Bot. 593 (1848). Generally distributed from New England and Canada to Oregon, and far northward.

The characters of the plants here combined are so inconstant as to invalidate all specific distinctions and even to obliterate any marked varietal limits. Ordinarily the perigynia of *C. trichocarpa* are hairy and the sheaths smooth, while the perigynia of var. *aristata* are smooth and the sheaths hairy. These differences are entirely inconstant, however, so that all degrees and conditions of hairiness are found. The shapes of perigynia vary as widely as the pubescence.

2. *C. VERRUCOSA*, Muhl., Gram. 261 (1817) (*C. glaucescens*, Ell., and *C. verrucosa*, Ell., Chapm. Fl. 542). Of the species which has gone under the name of *C. glaucescens*, Ell., there are two forms, one characterized by a single and rather long-stalked staminate spike and drooping pistillate spikes, and the other by one to three short-stalked staminate spikes and the upper pistillate spikes erect. The first form was first described by Muhlenberg as *C. verrucosa* in 1817 and in 1824 by Elliott (Sketch Bot. S. C. and Georgia, 553) as *C. glaucescens*. The form with shorter stalks and more erect spikes is described by Elliott (l. c. 555) as "*C. verrucosa*, Muhl.?" The two forms are not sufficiently distinct to merit even a varietal separation. They were united by Dr.

Boott, who used the name *C. glaucescens*, as later writers have done. The priority of Muhlenberg's name does not appear to have been noticed. Var. *androgyna*, Curtiss, Sill. Journ. xliv. 84, is a form with androgynous terminal spike, "flowering in October, quite polymorphous." Var. *polystachya*, Curtiss, Sill. Journ. vii. 410, is a small and polystachyous autumnal form "apparently produced by having been cropped early in the season by cattle." These varieties are merely occasional forms. Otto von Bæckeler in Linnæa, xli. 292 (1877) refers the species to *C. Brasiliensis*, St. Hilaire, a later and apparently distinct species. Margins of ponds, mostly in pine barrens, Virginia to Florida and Texas.

3. *C. CRINITA*, Lam. This plant grows from Canada to South Carolina and Texas. It is widely variable in the size of all its parts. The only form which appears to possess characters of any permanence is the var. *gynandra*, which is distinguished by rough sheaths, more loosely flowered, pistillate spikes and stouter scales. *C. Mitchelliana*, Curtiss, Chapm. Flora, 536, is a form with an androgynous terminal spike. Olney in his Exsiccata quotes *C. Caroliniana*, Schw. An. Tab., as a synonym of one form of *C. gynandra*, but I can trace no resemblance to any form of *C. crinita* in Schweinitz's key which leads to his *C. Caroliniana*. The synonymy of the species, so far as I know it, may be arranged as follows:

C. CRINITA, Lam., Dict. de Bot. iii. 393 (1789).

Var. *paleacea*, Dew., Sill. Journ. x. 270 (1826).

C. Mitchelliana, M. A. Curtiss, Sill. Journ. xliv. 84 (1843).

Var. *minor*, Boott, Ill. i. 18 (1858).

C. Porteri, Olney, Exsicc. (1871).

Var. *GYNANDRA*, Schw. & Torr., Monogr. 360 (1825).

C. gynandra, Schw., An. Tab. (1824).

C. gynandra, var. *Caroliniana*, Olney, Exsicc. (1871).

4. *C. HIRTA*, L. Resembles *C. Houghtonii* and *C. trichocarpa*, but differs in its very remote and smaller pistillate spikes and its loosely hairy perigynia, sheaths and leaves.—Introduced from Europe. Ashland, Mass., 1877, *Thos. Morong*; in ballast, Philadelphia, 1880, *F. L. Scribner*; and about Boston, *Wm. Boott*. Mr. Morong writes me as follows in regard to this species: "I have collected it for several years in succession. I first found it by the roadside in rather low lands and afterwards in yards around dwellings, among grass. I presume from these situations that it must have been introduced into this locality."

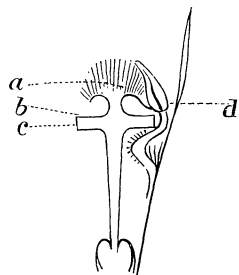
5. *C. GRAYI*, Carey, is sometimes found with hispid per-

igynia. Specimens from Athens, Ill. (*E. Hall*, 1861), and from Prof. Babcock, Ill., in Herb. Olney, are very sparsely hispid-hairy. Specimens from Greene county, N. Y. (*E. C. Howe*, 1869) are conspicuously so. Dr. Chapman finds similar specimens at Rome, Georgia. The species occurs as far east as New Jersey.

GENERAL NOTES.

Some Abnormal Rudbeckias.—While botanizing in Central Arkansas last summer, my attention was called to a patch of *Rudbeckia hirta*. There were about 50 plants in bloom, and in at least half of the heads more or less of the ray flowers were quilled. Sometimes only one ray in the head was abnormal; in other heads several, and in quite a number of heads all the rays were quilled. Normal and abnormal heads occurred on the same plant. Some of the plants bore several heads, all of which were abnormal. The abnormal flowers were generally shorter than the normal. There was a great difference in the amount of quilling even in the same head, varying from a mere ring at the base to a tube extending nearly to the top. The end of the ray was usually two-toothed, as in the normal form. The plants were normal in height and had faultless stems and leaves. I am unable to account for this general teratological display, or to assign a reason why normal and abnormal plants were growing side by side, much less to account for normal and abnormal heads occurring on the same plant.—F. L. HARVEY, *Fayetteville, Ark.*

Cross-pollination in *Vinca minor*.—Le Maout and Decaisne say that in



a. Stigmatic surface; b. pollen shelf; c. viscid ring; d. anther.

Vinca minor the "pollen is granular, applied directly to the stigma." From the abundance of well-protected nectar, and the elaborate arrangement of parts in the neighborhood of stigma and anthers, cross-pollination seems at least to be the presumption. The accompanying figure shows the relations of the parts concerned. The pollen falls from the whole anther in a single mass (a habit becoming much more decided in the allied *Asclepiadaceae*) upon the edge of the pollen shelf (b). Often the five masses of pollen are found lying upon this shelf at the same time. The outer face of the shelf (c) is very viscid. Although the anthers (d) extend well up toward the stigmatic surface (a), the pollen masses are

guided by an arrangement of hairs down upon the disk below. A proboscis (or needle) thrust down the line of the nectar guides passes between contiguous anthers, and rubbing along the viscid ring becomes so smeared that when withdrawn the pollen masses lying upon the edge of the shelf are also withdrawn, not in a mass, but broken up into a line of pollen grains. Every insertion of a